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Date: MARCH 2, 1977

Project Title: THE ECONOMIC IMPACT OF GEORGIA'S DEEPWATER PORTS

Project No: A-1950

Project Director: MR. LARRY R. EDENS

Sponsor: GEORGIA PORTS AUTHORITY

Agreement Period: From 1/17/77 Until 7/18/77

Type Agreement: STD. IND. AGREE. DTD. JAN. 5, 1977

Amount: $21,258

Reports Required: PROGRESS, FINAL

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Technical Matters	Contractual Matters (thru OCA)
MR. WESLEY ALLEN, JR. DIRECTOR OF ENGINEERING, PLANNING & MAINTENANCE GOERGIA PORTS AUTHORITY P.O. BOX 2406 SAVANNAH, GEORGIA 31402	

Defense Priority Rating:

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CA—3 (3/76)

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SPONSORED PROJECT TERMINATION

No action req'd OH

Date: February 15, 1978

Project Title: The Economic Impact of Georgia's Deepwater Ports

Project No: A-1950

Project Director: David S. Clifton

Sponsor: Georgia Ports Authority

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X Final Invoice ~~and Closing Documents~~

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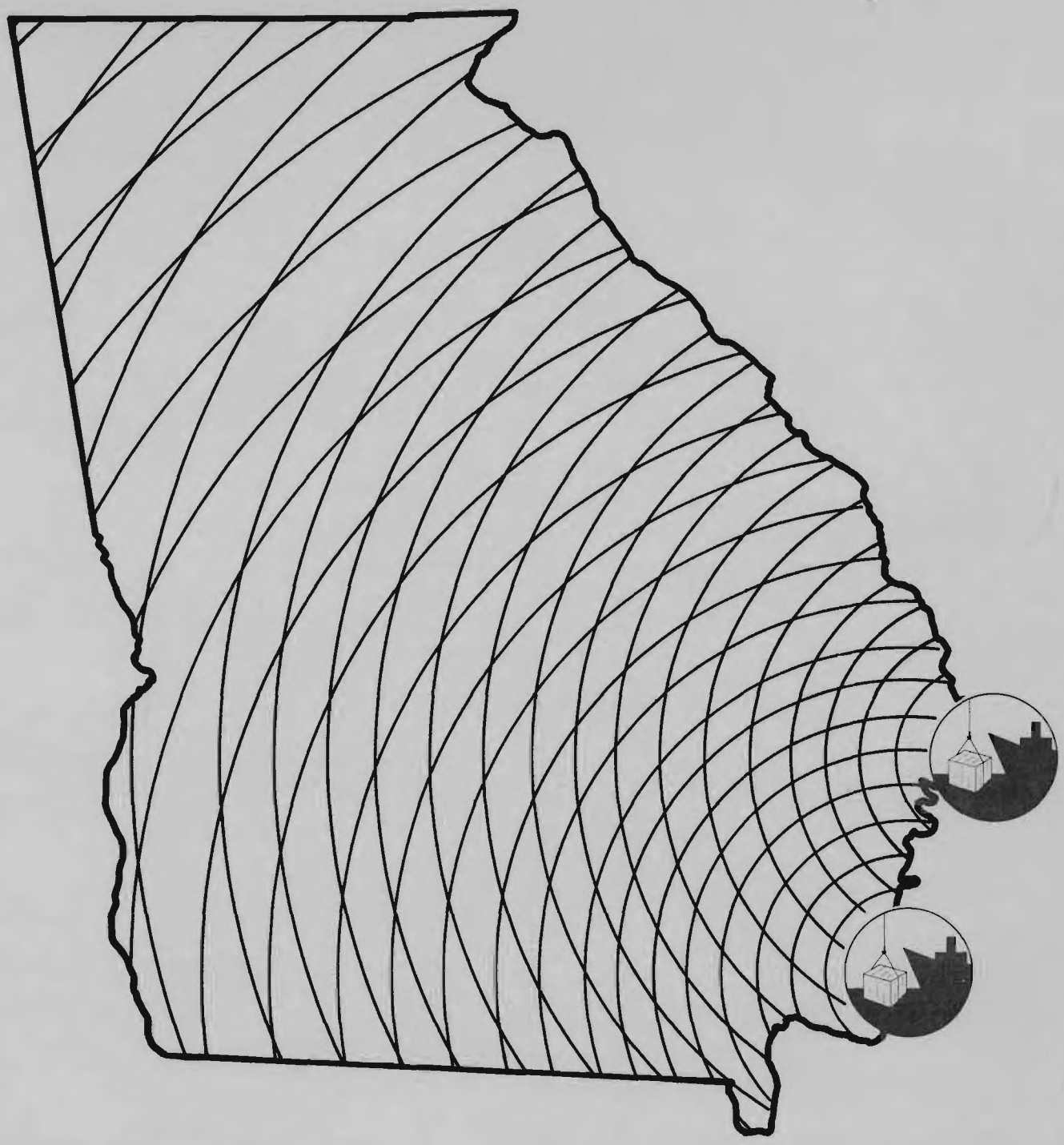

The ECONOMIC IMPACT of Georgia's Deepwater Ports

Project A-1950

THE ECONOMIC IMPACT OF GEORGIA'S DEEPWATER PORTS 1976

by

Nicholas S. Gibson

and

Larry R. Edens

Economic Development Division
Technology and Development Laboratory
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
August 1977

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Acknowledgments

The authors express appreciation to the Georgia Ports Authority whose support made this study possible. In addition, we are indebted to individuals at the Georgia Department of Industry and Trade; Georgia Department of Agriculture; U. S. Department of Commerce; Georgia Agribusiness Council; Southern Railway in Washington, D. C.; and the American Association of Port Authorities.

Summary

Georgia's role in international trade has grown over recent years. In 1972 there were approximately 70 foreign firms with facilities within the state; in 1976 there were approximately 200 such firms. In addition, there are more U. S. firms engaged in foreign trade within the state than in 1972. Europe receives the bulk of exports from Georgia's ports, over 50%, followed by Asian countries with over 25%. However, almost 50% of Georgia's imports originate in North America, while Venezuela accounts for 33.5% of the imports. The value of agricultural exports from Georgia grew from $115.3 million in 1970 to $394.3 million in 1976 with a peak in 1975 of $450.8 million. It is felt that the completion of the grain elevator at Savannah will be a major outlet for Georgia's abundant agricultural resources.

Both domestic and foreign freight tonnages in Georgia's ports have shown steady, overall increases over the last 26 years. This has paralleled a growth pattern of the United States waterborne traffic which grew at an annual rate of 3.0% from 1950-1960 and 3.4% per year from 1960-1970; from 1970-1976 the growth rate fell slightly to 3.1% per year. Savannah experienced an increase in traffic in 1976 over 1975, going from a growth rate of 4.6% per year from 1960-1970 to 5.1% average annual growth rate from 1970-1976. The amount of freight moving through the Port of Brunswick has shown continued growth through 1976 except for a decline in 1975. Nonetheless, the average annual rate of growth from 1970 to 1976 was 8.1%. Foreign freight continues to be over 60% of the traffic in the port of Savannah and over 50% in Brunswick.

The total tonnages of the Georgia Ports Authority operations have marked growth patterns with the exception of the fiscal years ending 1975 and 1976. This break in the steady growth pattern is attributable primarily to the oil embargo and the ensuing stagnation of the economy of the United States as well as most other areas of the world. Even with the tapering off in the last two fiscal years, the GPA operations averaged an annual growth rate of 6.2% over the period from 1960 to 1976. One area which has grown quickly and has not dropped substantially with the recent economic downturn is the container operation. Over the four-year period from fiscal year ending 1973 through 1976 the container tonnages represent an average annual rate of growth of approximately 22%.

Like any other major economic agent the presence of the ports in Savannah and Brunswick can be felt throughout the community and region. In order to determine the direct impact of the ports, a survey of firms was made, the results of which were combined with the Georgia Input-Output Model to produce the final direct and total figures. The firms were divided into two classifications: port-services and port-users. Firms were considered to be port-services if some or all of their business was directly related to the port. Port-users consist of the firms that use the ports for import/export purposes: importing raw materials and access to markets.

The total impact of the port-services on employment and income in 1976 is 12,159 jobs and $183 million, respectively, and $20 million in city/county/state taxes. The total revenue impact was approximately $578 million. Land transportation provided the largest impact generating a total of $58.8 million of personal income.

The total impact of the port-users on employment and income is 29,088 jobs and $416.9 million, respectively. A total of over $64 million in city/county/state taxes is generated by the port-users; and total revenues, both direct and indirect, are $1.979 billion. The economic impact indicated for port-users, however, must be interpreted as a maximum limit of the *true* economic impact, which is a nonquantifiable figure lying somewhere below the limit.

The economic impact of the deepwater ports appears to be substantially greater in 1976 than 1972 (in constant 1972 dollars). Both port-service and port-user firms indicate increases in each category: revenue, employment, income, and taxes. In constant dollars (1972) total personal income generated by port-services grew from $103.8 million to $135.6 million, an average annual rate of growth of 6.9%; employment and taxes registered an annual rate of growth of 5.4%, employment increasing from 9,834 to 12,159 total jobs generated by port-related business. Total revenues for port-services increased from $342 million to $428 million in 1972 dollars, a 5.8% annual growth rate.

The port-users impact (in 1972 dollars) on total personal income increased from $211.3 million to $285.5 million, an average annual rate of growth of 7.8%. Employment figures jumped from 20,191 to 29,088, a 9.6% rate of growth annually. Total tax revenues to state and local governments increased at a 7.1% annual rate from $33.3 million to $43.8 million total. Total revenues generated increased from 1972 to 1976 at an annual rate of growth of 10%, from $929.5

million to $1.359 billion. The impacts on revenues are highest in the textile and paper industries; the next three places shift from one study to the next between chemicals, trade, food products, machinery, and fabricated metal products.

Future economic impacts of Georgia's deepwater ports cannot be calculated directly because of the many variables involved. It is possible, however, to estimate the future traffic movements through the ports with some degree of confidence. Based upon foreign gross national products, population growths, and various personal income levels, the projections indicate that Brunswick will handle between 1.6 and 1.75 million tons of freight in 1980 and between 2.2 and 2.3 million tons of freight in 1990, exhibiting an average annual growth rate of between 2.9% and 3.3% from 1975 to 1990. The results show Savannah will handle from 9.5 to 10.3 million tons in 1980 and between 13.5 and 15.5 million tons in 1990 for an average annual growth rate between 3.9% and 4.9% from 1975 to 1990. Future levels of port activities will also be a function of the competitive position of Georgia's ports in the South Atlantic.

I. INTRODUCTION

The purpose of this study is to determine the influence of Georgia's deep-water ports in Savannah and Brunswick on the economy of the State of Georgia. The technique employed is an evaluation of the economic impact of the ports.

Before the actual calculations and discussion of the impact, Georgia's role in the international economy of the United States and the world is presented. The presence of foreign investment within the state plus an analysis of the origins and destinations of imports/exports from the ports are presented in this section.

Following is a brief overview of the history of freight movements through the ports of Brunswick and Savannah: total, domestic versus foreign, and import versus export. A breakdown of the major commodities moving through the ports is also presented. The next section deals with the operations of the Georgia Ports Authority facilities only. Total tonnages as well as container movements are highlighted.

The economic impact of the ports is then evaluated and presented in terms of personal income, employment, revenues, and state and local taxes. After the current economic impact is evaluated, the next section compares the results of the 1976 impacts with those established in the 1972 study.

Finally, the levels of future traffic movements are projected through 1980 and 1990 with a brief look at the future needs and facilities of the ports as well as their competitors.

II. GEORGIA'S POSITION IN INTERNATIONAL TRADE

Georgia ranked 17th in percentage of total U. S. exports in 1972 (latest available figures); among southern states it was fourth behind North Carolina, Virginia, and Tennessee (ranked 13, 15, and 16, respectively), and its $650.9 million in exports was 1.8% of the total for the 50 states and the District of Columbia.[1/]

One key to Georgia's role in international trade is the presence of foreign investment within the state; this can take the form of a manufacturing facility, regional office, sales/service warehousing facilities, or parent-company control. In 1972 there were approximately 70 such offices or plants within the state; the data indicate that there are now approximately 200 such firms, a net increase of 130 firms. Of the 21 countries represented, the United Kingdom leads with 27 newly established (since 1972) firms, followed by Japan with 22, Canada, France, and West Germany each with 13, and the Netherlands with 11.[2/]

The information supplied in Map 1 indicates the extent of Georgia's firms engaged in international operations. For each county the numeral indicates the number of firms in that county as compiled in the 1976 Georgia Manufacturing Directory. The accompanying design indicates the appropriate level of employment of those firms for each county.

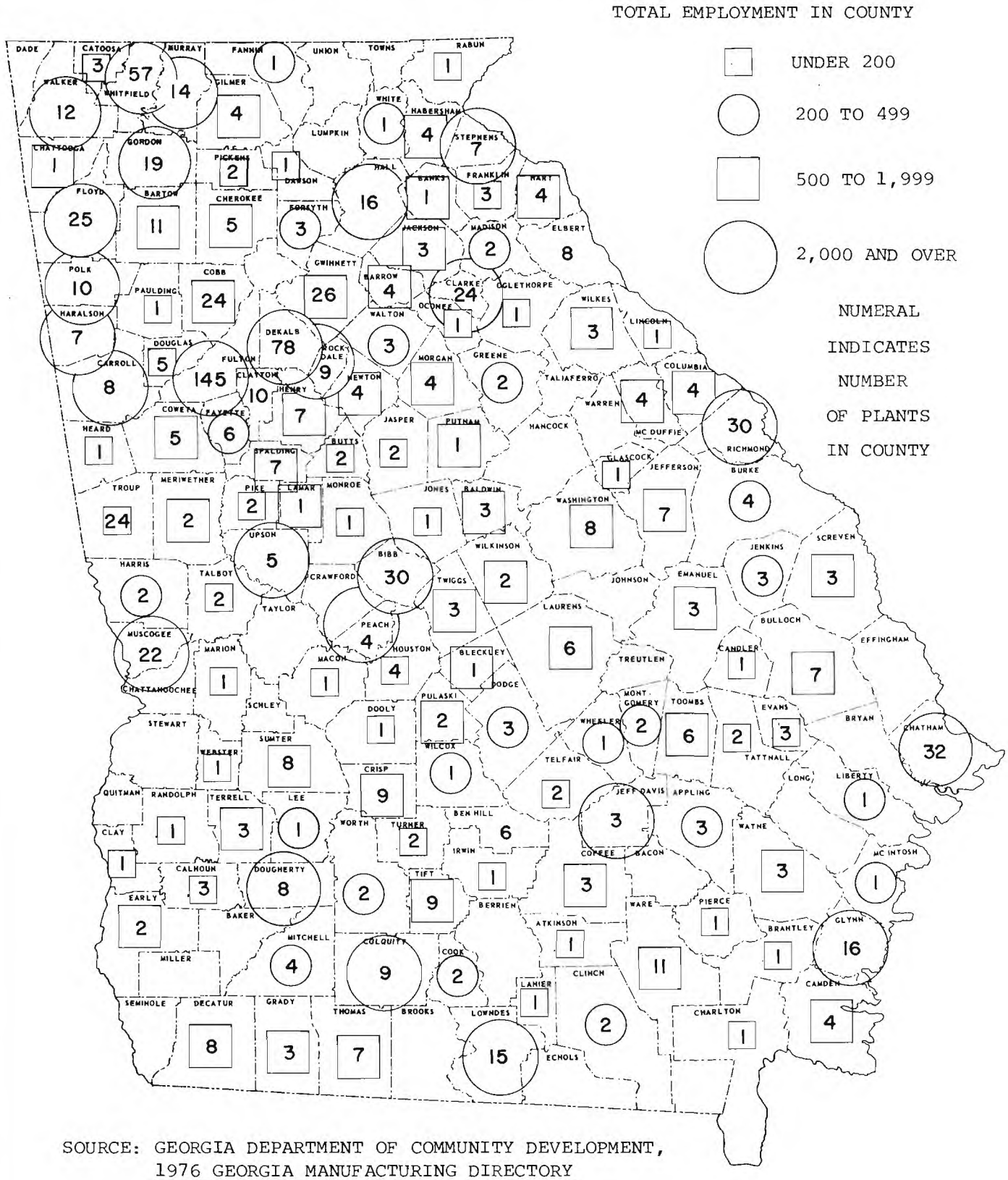
Tables II-1 and II-2 indicate the destinations of exports from Georgia's deepwater ports and origins of its imports in percent of tonnage. As can be seen, freight moves to all points of the world from Savannah and Brunswick. Europe receives the bulk of exports from Georgia's ports, over 50%, with West Germany receiving 17% of all exports from Georgia, followed by Italy, the Netherlands, and the United Kingdom. Asian countries receive 26.5% of the total exports, with Japan leading all nations with 19.6% of the exports from Brunswick and Savannah.

1/ U. S. Department of Commerce, Bureau of the Census, Social and Economic Statistics Administration, "Survey of the Origin of Exports of Manufacturing Establishments in 1972," Current Industrial Reports, p. 103.

2/ Georgia Department of Industry and Trade, International Division, "International Companies with Facilities in the State of Georgia," December 1976.

MAP 1

GEORGIA MANUFACTURING ESTABLISHMENTS
ENGAGED IN INTERNATIONAL OPERATIONS, 1976



SOURCE: GEORGIA DEPARTMENT OF COMMUNITY DEVELOPMENT,
1976 GEORGIA MANUFACTURING DIRECTORY

Table II-1

DESTINATION OF EXPORTS FROM GEORGIA'S DEEPWATER PORTS
BY CONTINENT AND SELECTED COUNTRIES, 1976

	Percent of Total Export Tonnage
North America	5.5
Canada	0.2
Central America	2.6
Caribbean	2.7
South America	8.1
Brazil	3.9
Venezuela	2.2
Argentina	1.3
Europe	51.7
West Germany	17.5
Italy	7.0
Netherlands	6.9
United Kingdom	5.7
Spain	4.3
France	2.8
Belgium and Luxembourg	2.4
Sweden	0.8
Asia	26.5
Japan	19.6
Israel	2.0
Iran	1.6
Australia and Oceania	1.6
Australia	1.5
Africa	6.6
Republic of South Africa	1.8
Canary Islands	1.4
Egypt	1.0
Nigeria	0.9

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, EA 663, "U. S. Exports - Customs District of Exportation by Country of Destination by Schedule B Number and Method of Transportation," 1976 Annual (Microfilm).

Table II-2

ORIGIN OF IMPORTS TO GEORGIA'S DEEPWATER PORTS
BY CONTINENT AND SELECTED COUNTRIES, 1976

	Percent of Total Import Tonnage
North America	46.2
Canada	17.8
Bahamas	15.9
Netherland Antilles	11.4
South America	35.4
Venezuela	33.5
Europe	6.6
Belgium and Luxembourg	2.7
United Kingdom	0.9
Netherlands	0.8
West Germany	0.6
Asia	10.0
Japan	3.8
India	1.8
Bangladesh	1.2
Korea	1.1
Australia and Oceania	0.6
Australia	0.6
Africa	1.2

Source: U. S. Department of Commerce, Bureau of the Census, Foreign Trade Division, IA 254, "U. S. Imports for Consumption and General Imports - Customs District by Country of Origin by TSUSA Number by Unit Control and Method of Transportation," 1976 Annual (Microfilm).

In contrast with the destinations of the exports, only 6.6% of Georgia's imports arrive from Europe and only 3.8% from Japan. Rather, almost 50% of Georgia's imports originate in North America, 17.8% in Canada, 15.9% in the Bahamas, and 11.4% in the Netherland Antilles. In addition, Venezuela accounts for 33.5% of the imports. Therefore, while only 13.6% of exports from Georgia are destined for the Western Hemisphere, over 80% of its imports originate within it.

Another source of export trade for the state lies in its agricultural sector. The value of agricultural exports from Georgia grew from $115.3 million in 1970 to $394.3 million in 1976 (fiscal year), with a peak in 1975 of $450.8 million. (See Table II-3.) The 1976 total equaled 1.78% of the U. S. total

Table II-3

VALUE OF AGRICULTURAL EXPORTS FROM GEORGIA

Fiscal Year	Value (million dollars)
1970	115.3
1971	141.5
1972	172.9
1973	207.0
1974	329.5
1975	450.8
1976	394.3

Source: U. S. Department of Agriculture, Economic Research Service, "Foreign Trade of the United States," October 1976, and Georgia Department of Agriculture, International Trade Division.

agricultural exports. Georgia ranked first in the export of peanuts with $46.8 million, second in poultry products with $18.9 million, second in nuts and preparations (pecans) with $4 million, and fourth in unmanufactured tobacco with $76.6 million. Georgia also ranks high in cotton, cottonseed oil, feed grains, soybeans, peanut oil, and protein meal. Of Georgia's total crop values, corn ranked first in 1976 in the state with 28.3% of the total value, followed by peanuts with 26.9%, soybeans with 12.4%, and tobacco with 11.8%.[3/] It is felt that the completion of the $4.5 million grain elevator (including ten silos) by the GPA at Savannah in the fall of 1977 will be a major outlet for exporting Georgia's abundant agricultural resources at additional savings to Georgia farmers. The presence of the grain elevator facility should be a major boost

3/ Georgia Crop Reporting Service, USDA, "Georgia Farm Report," with the Georgia Department of Agriculture, January 25, 1977.

to the agricultural sector of the state's economy because it opens a lower-cost and, hence, expanded market to Georgia's farmers.

The outlook, therefore, for Georgia's role in international trade appears to have wide horizons. The increased number of foreign companies within the state, the increased number of American firms with international markets within the state, and Georgia's strong agricultural sector indicate that foreign trade is, indeed, a growth sector of the state's economy.

III. TONNAGES OF GEORGIA'S DEEPWATER PORTS

Both domestic and foreign freight tonnages in Georgia's ports have shown steady, overall increases over the last 25 years; this has paralleled the growth pattern of the United States waterborne traffic, in general. Table III-1 shows the tonnages which moved through the ports of Brunswick and Savannah along with the total of United States waterborne movements.

Table III-1

FREIGHT TRAFFIC FOR BRUNSWICK, SAVANNAH, AND UNITED STATES

Year	Freight Traffic (000 short tons)		
	Brunswick	Savannah	United States
1950	131.3	3,471.2	820,584
1960	787.3	4,325.2	1,099,850
1970	1,053.2	6,810.8	1,531,697
1971	1,059.1	7,231.9	1,512,584
1972	1,263.1	8,037.2	1,616,793
1973	1,393.7	8,980.2	1,761,552
1974	1,965.8	9,698.7	1,746,789
1975	1,430.4	7,593.3	1,695,034
1976	1,685.8	9,187.8	1,835,006

Year	Average Annual Rate of Growth (%)		
	Brunswick	Savannah	United States
1950-1960	19.6	2.2	3.0
1960-1970	3.0	4.6	3.4
1970-1976	8.1	5.1	3.1

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlantic Coast and Part 5: National Summaries, 1950, 1960, 1970, 1976.

The steady growth of waterborne traffic in the United States was interrupted in 1974 and 1975 when it experienced decreases in freight traffic. This fall in traffic is attributed to reduced economic activity around the world in the recession of 1974-1975. The tonnage increased in 1976, however, to over 1.8 billion short tons; this gives the United States an average annual

rate of growth from 1970 to 1976 of 3.1%, slightly lower than the rate of growth experienced in the previous decade. Savannah had a record tonnage in 1974 only to experience a 24% drop in freight in 1975. It has rebounded from the recession, however, in 1976 to almost 9.2 million tons, but still short of its 9.7 million ton peak in 1974. Even with the recession, Savannah's average annual growth rate is 5.1% for 1970-1976, higher than either of the previous decades. Like Savannah, the Port of Brunswick experienced a sharp drop in tonnage from 1974 to 1975 and showed a substantial recovery in 1976. Except for the recession, Brunswick has shown remarkably high levels of growth from 1970. The average annual rate of growth from 1970 through 1976 is 8.1%. In 1970 Georgia's deepwater ports handled 0.5% of all waterborne traffic in the United States; in 1976 this percentage was almost 0.6%.

Table III-2 breaks down the tonnage for both Georgia ports and the United States between domestic and foreign movements. The absolute levels of domestic and foreign freight are higher in 1976 than in 1970 in every case, but the proportions have changed. The United States has experienced a shift from domestic towards foreign; although domestic freight is still 53.4% in 1976, it has fallen continuously from 1950. Savannah has experienced similar movements over the

Table III-2

TONNAGE BY TYPE OF MOVEMENT FOR BRUNSWICK, SAVANNAH, AND UNITED STATES PORTS

	Brunswick		Savannah		United States	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1950						
Tons (000)	131.3	-	1,812.7	1,658.5	651,359	169,225
% of Total	100.0	-	52.2	47.8	79.4	20.6
1960						
Tons (000)	339.1	448.2	1,811.0	2,514.2	760,573	339,277
% of Total	43.1	56.9	41.9	58.1	69.2	30.8
1970						
Tons (000)	370.2	683.0	2,676.1	4,134.7	950,728	580,969
% of Total	35.2	64.8	39.3	60.7	62.1	37.9
1976						
Tons (000)	812.2	873.6	3,236.1	5,951.7	979,043	855,964
% of Total	48.2	51.8	35.2	64.8	53.4	46.6

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlantic Coast and Part 5: National Summaries, 1950, 1960, 1970, 1976.

years. Foreign freight has shifted from 47.8% to 58.1% to 60.7% in 1950, 1960, and 1970, and finally to 64.8% in 1976. Brunswick, on the other hand, has moved in the other direction from 1970 to 1976, with domestic freight increasing from 35% to 48% of the total freight.

Foreign freight movements are divided into exports and imports in Table III-3. United States imports were almost 67% of the foreign tonnage in 1976; this is an increase from 58% in 1970. Savannah's traffic has remained in approximately the same proportion from 1970 to 1976; of its foreign traffic 67% is imported. Brunswick has shifted almost completely to imports, with 97% of its tonnage moving into the port, a substantial difference from the 80% imports in 1970.

Table III-3

EXPORT AND IMPORT TONNAGES FOR BRUNSWICK, SAVANNAH, AND UNITED STATES PORTS

	Brunswick		Savannah		United States	
	Exports	Imports	Exports	Imports	Exports	Imports
1950						
Tons (000)	0	0	248.1	1,410.4	67,243	101,982
% of Foreign	-	-	15.0	85.0	39.7	60.3
1960						
Tons (000)	22.6	425.6	615.5	1,898.7	127,961	211,316
% of Foreign	5.0	95.0	24.5	75.5	37.7	62.3
1970						
Tons (000)	136.4	546.6	1,398.2	2,736.5	241,629	339,340
% of Foreign	20.0	80.0	33.8	66.2	41.6	58.4
1976						
Tons (000)	22.4	851.2	1,962.6	3,989.2	285,645	570,319
% of Foreign	2.6	97.4	33.0	67.0	33.4	66.6

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlanta Coast and Part 5: National Summaries, 1950, 1960, 1970, 1976.

Tables III-4 and III-5 show the major commodities which moved through the ports of Brunswick and Savannah in 1975.

Table III-4

PRINCIPAL COMMODITY MOVEMENTS THROUGH BRUNSWICK HARBOR, 1976

Commodity	Short Tons	Percent of Total	Cumulative Percent
Residual Fuel Oil	633,352	37.6	37.6
Salt	260,009	15.4	53.0
Limestone	243,998	14.5	67.5
Pulp	187,641	11.1	78.6
Distillate Fuel Oil	154,505	9.2	87.8
Basic Chemicals and Products, N.E.C.	93,348	5.5	93.3
Sodium Hydroxide	52,500	3.1	96.4
All Other Commodities	60,457	3.6	100.0

Table III-5

PRINCIPAL COMMODITY MOVEMENTS THROUGH SAVANNAH HARBOR, 1976

Commodity	Short Tons	Percent Of Total	Cululative Percent
Residual Fuel Oil	1,922,308	20.9	20.9
Gasoline	838,725	9.1	30.0
Crude Petroleum	758,549	8.3	38.3
Clay	736,151	8.0	46.3
Distillate Fuel Oil	711,381	7.7	54.0
Limestone	522,263	5.7	59.7
Pulp	402,799	4.4	64.1
Paper and Paperboard	395,010	4.3	68.4
Asphalt, Tar, and Pitches	342,866	3.7	72.1
Basic Textile Products	195,543	2.1	74.2
Sulphur, Liquid	128,272	1.4	75.6
Naphtha, Petroleum, Solvents	121,565	1.3	76.9
Iron, Steel Shapes, Excluding Sheet	121,417	1.3	78.2
Basic Chemicals and Products N.E.C.	119,763	1.3	79.5
Building Cement	111,068	1.2	80.7
Machinery, except Electrical	100,055	1.1	81.8
Iron and Steel Scrap	98,527	1.1	82.9
Gum and Wood Chemicals	91,879	1.0	83.9
All Other Commodities	1,469,664	16.1	100.0

IV. GEORGIA PORTS AUTHORITY OPERATIONS

The State Ports Authority was created March 9, 1945, and the name was changed to the Georgia Ports Authority by a Legislative Act approved in February, 1949. It is an "instrumentality" of the state but is not considered a part of state government and, hence, exercises more autonomy over its budget of expenditures and purchases than a state agency. As an authority it operates the Ocean and Garden City terminals in Savannah, the State Docks and Warehouses in Brunswick, and the State Dock-Barge terminals in Augusta, Bainbridge, and Columbus.

The deepwater port operations in Brunswick and Savannah are indicated below in Table IV-1. The total tonnages have marked growth patterns with the exception of the fiscal year ending 1975, which shows a drop in tonnages, and

Table IV-1

TOTAL TONNAGES HANDLED AT GPA
(FY 1960-FY 1976)

Fiscal Year Ending June 30	Brunswick State Docks	Savannah		Total
		Garden City Terminal	Ocean Terminal	
1960	-	850,271	201,078	1,051,349
1965	68,672	1,090,051	455,500	1,614,223
1970	171,974	1,416,453	785,581	2,374,008
1971	154,179	1,541,090	838,180	2,533,449
1972	115,872	1,597,970	799,368	2,513,210
1973	101,691	1,968,111	746,742	2,816,544
1974	100,234	2,283,642	670,961	3,054,837
1975	132,629	2,093,127	652,303	2,878,059
1976	103,847	2,029,420	613,155	2,746,422

Source: Georgia Ports Authority, Report of Operations, 1976.

again in FY 1976. This break in the steady growth pattern is attributable primarily to the oil embargo and the ensuing stagnation of the economy of the United States as well as most other areas of the world. Even with the tapering off in the last two fiscal years, the GPA operations averaged an annual growth

rate of 6.2% over the period from 1960 to 1976. Over the same period, the Garden City Terminal experienced an average annual rate of growth of 5.6%, and Ocean Terminal grew at a rate of 7.2%. From 1965 through 1976, the Brunswick State Docks averaged a rate of growth equal to 3.8%.

One area which has grown quickly and has not dropped substantially with the recent economic downturn is the container operation. The first full year of operation of the container area was fiscal year ending 1973. Its history of tonnages handled is indicated in Table IV-2. Over the four-year period this represents an average annual rate of growth of approximately 22%. This high

Table IV-2

CONTAINER TONNAGE HANDLED
(FY 1973-FY 1976)

Fiscal Year Ending June 30	Import	Export	Total
1973	67,712	187,927	255,639
1974	126,236	296,748	422,984
1975	144,927	273,182	418,109
1976	159,565	303,941	463,506

Source: Georgia Ports Authority, Report of Operations, 1973, 1974, 1976.

rate of growth may decline slightly from the initial start-up rate, but it is expected to maintain a strong growth pattern because of the increasing use and importance of containerization in freight handling. The GPA is preparing for such growth by its emphasis on and construction of container berth facilities. Containerization is discussed further in Section VII.

V. ECONOMIC IMPACT OF THE DEEPWATER PORTS

Like any other major economic agent the presence of the ports in Savannah and Brunswick can be felt throughout the community and region; similarly, the presence of and access to the ocean and waterborne commerce is felt through the deepwater ports. Measuring the impact of an economic force in the community can take on several forms, including cost-effectiveness or cost-benefit analyses, simulation-modeling, and input-output analysis. Ports are eclectic in nature and, consequently, assigning specific benefits in dollars or costs in dollars is deceptive. Georgia's deepwater ports are combinations of public and private docks and facilities, and the channels are maintained (like all other U. S. waterways) by the Corps of Engineers. Pinpointing where the benefits of public docks and facilities begin and end is questionable at best. Further, calculating the difference in benefits and costs to the community and state using a scenario in which the ports did not exist is impossible; there is no way to determine what firms would or would not be located within the state or communities without ports, what firms presently located in the community or region would move away, and what firms in the future would or would not move into the state/community without deepwater ports.

The inability to calculate credible costs and benefits leads to other forms of inquiry. An input-output analysis makes it possible to understand more clearly the intertwined workings of a regional economy; the supply and demand within each sector is connected to the supply and demand of the remaining sectors in the economy. By examining the level of demand or the change in demand in any one sector, determination can be made within the region of the effects throughout the rest of the economy. For example, each industry sells its output to other industries as an intermediate good and to the ultimate consumer as final demand or as a final good. The industries include manufacturing, mining, construction, agriculture, trade, services, and households (which sell labor and skills). A change in the level of output in a given industry affects its input levels and therefore the outputs in the other industries from which it normally buys goods and services, which in turn will affect their respective inputs, and so on. Therefore, an absolute increase or decrease in demand in one industry has repercussions throughout the rest of the industries in the region in varying degrees. This is the basis for input-output analysis and is the form which the impact study of Georgia's deepwater ports will take. The

point of departure for the analysis is examining the direct impact (the effects on immediate demand) of the port. This includes the determination of the employment, revenues, incomes, and taxes which are generated directly by port activity. The second step is an analysis of the repercussions throughout the regional (state) economy, i.e., the indirect effects.

It should be noted here that simply because a figure is given as the level of direct port activity, it should not be interpreted to mean that none of that employment, revenue, etc., would be present if the port were not there. As mentioned above, drawing such implications yields little in the form of practical results. It is worthwhile noting, however, that general observations can be made, such as the fact that without a port there would probably be fewer firms involved in water transportation and marine supplies, for example; meanwhile, there may be no effects on the carpet industry if there were no deepwater ports in Georgia -- they would simply import jute through other ports. Or, many of the carpet firms may not have located in Georgia to begin with. The point is that no implications should be made about Georgia's economy without deepwater ports. Rather, an attempt is made to determine the impact of the ports by examining what jobs, revenues, etc., are currently generated by companies involved in waterborne commerce and port activities and by those companies which use the ports to import factors of production and export goods for sale.

The Survey of Firms

In order to determine the direct impact of the ports, a survey of firms was made, the results of which were combined with the Georgia Input-Output Model to produce the final direct and total figures. Just as in the previous study (1972) on the economic impact of Georgia's deepwater ports, the firms were divided into two classifications: port-services and port-users. Firms were considered to be port-services if some or all of their business was directly related to the port. For example, shipping agencies, marine construction, piloting, towing, and marine freight-forwarding are all examples of directly port-related activities. Firms engaged in such activities with the ports of Brunswick and Savannah are included in the port-services category. The second category, port-users, consists of the firms, as mentioned above, that use the port for import/export purposes: importing raw materials and intermediate and final goods and exporting intermediate and final goods. The

greatest percentage of these firms are manufacturing firms, but the survey includes agriculture, bulk (liquid and dry) commodities, and trading companies.

The survey was made up of several questionnaires. Two basic questionnaires (with variations) were used: one for port-users and another for port-services. Both questionnaires asked for information for the calendar year 1976 about number of employees, payrolls, state and local taxes paid, and sales or business volume. The port-users questionnaire asked what percentage of the firm's 1976 business volume was dependent upon the ports in Brunswick and Savannah for receipt of raw materials and for access to domestic and foreign markets. It also contained questions about the firm's possible use of other ports and reasons for using the other ports, in addition to finding information about the exports and imports of the firm.

The port-services questionnaires contained other questions which were suited to the type of firm which was being questioned. Those firms which were thought to be directly related to port activities were asked what form this relation took, i.e., freight forwarding, steamship agency, piloting, towing, dredging, terminal operator, stevedoring, salvage, marine supplier, container service, or other. Truck lines were asked about port-related business volume for their Brunswick and Savannah terminals. Railroads were asked about origins and terminations at the ports. Banks, law firms, and insurance agencies were sent questionnaires suited to each form of business.

Finally, government and government-related agencies were sent questionnaires concerning employees, payroll, and percent involvement with the ports. These agencies included the Coast Guard, Port Authorities, Customs, Corps of Engineers, and others.

The percentages which were reported for all of the above port-service and port-user firms were then applied to the reported 1976 business or sales volumes (or payrolls in the case of government agencies) to determine what dollar business volume was port-related. Using the percentages, the answers to the questionnaires, and the Georgia Input-Output Model, direct and total employment, revenue, payrolls, and state/local taxes were calculated.

To determine the firms to be questioned, several sources were sought. The 1976 Georgia Manufacturing Directory, the Georgia Ports Authority, the Georgia Bureau of Industry and Trade, the International Trade Division of the

Georgia Department of Agriculture, and the U. S. Department of Commerce were all beneficial in supplying information or lists of firms which were engaged in international commerce or port-related business to varying degrees. All of these firms were sent questionnaires with a letter explaining the nature and purpose of the study which was being made. Personnel from Georgia Tech conducted interviews in many cases to assure that information was complete and as accurate as possible.

A total of 1,976 firms were contacted, and 615 replied (31%). Of the responses, 349 actually use the ports to some degree and were used to calculate the economic impact. Table V-1 indicates that 71% of the port-services firms which were surveyed responded and 26% of the port-user firms responded. Of the total number of firms which have usable data, 131 are port-service firms and 218 are port-users. Table V-2 breaks down the port-user firms into three categories: manufacturing firms, agricultural firms, and those firms which are engaged in wholesale/retail trade. The very low rate of response of agricultural firms is interpreted in two ways: first, it seems probable that if the firm (or farm in this case) did not engage in international trade or use the Georgia ports, it would not reply at all. In this case no response means no use of the port. Second, it is even more probable that the farmer sells his commodities through a cooperative or large broker and really does not know where the commodities end up, much less how they get there.

Table V-1

SURVEY RESPONSE

	Firm Classification		
	Port-services	Port-users	Total
Total firms surveyed	225	1,751	1,976
Number of respondents	159	456	615
Percent responding	71	26	31
Port-related firms with usable data	131	218	349

Table V-2

PORT-USER RESPONSES

	Manufacturing	Agricultural	Trade
Total firms surveyed	1,074	235	442
Number of respondents	328	36	92
Percent responding	31	15	21
Port-related firms with usable data	153	11	54

There are several aspects of this survey which should be noted. First, one different aspect of this survey versus the 1972 study is that no averages were applied to firms in the same classification which did not respond. Therefore, all figures are from actual responses and in no case is an extrapolation applied to a group of firms.

Second, if a response was received which included most of the information except business volume (for reasons of company policy, confidence, or whatever), the payroll figure was used as a (conservative) proxy for the business volume and the appropriate port-related percentage was applied to that figure.

Third, the wholesale trade firms required some different calculations than did agricultural or manufacturing firms. It is logically appealing that merchandise which is wholesaled, retailed, and consumed within the state contributes more to the state economy than one which is simply moved through the state by a broker, to be sold and consumed elsewhere. For this reason the wholesale goods were divided between durables and nondurables. The port-related business volume of the durable commodities was then multiplied by the wholesale margin (percentage of value-added) ratio of durable commodities[1/] and by the ratio of wholesale trade to total trade.[2/] The port-related business volume of the nondurable commodities was multiplied by the wholesale margin (percentage of value-added) ratio for nondurable commodities only. It is felt that this technique avoids overstating the impact of trading firms.

1/ "Personal Consumption Expenditures in the 1963 Input-Output Study," Survey of Current Business, Vol. 51, No. 1, January 1971, pp. 34-38.

2/ U. S. Department of Commerce, Office of Business Economics, Input-Output Structure of the U. S. Economy: 1963, Volume 1 -- Transactions Data for Detailed Industries (A Supplement to the Survey of Current Business).

There were other small differences and irregularities in some of the responses, which is to be expected with a mail survey of this magnitude. If the impact of the particular firm was significant, the firm was contacted for clarification. If the impact was judged to be insignificant by itself, the most conservative interpretation of the data was applied. It was hoped that in this manner the most complete and conservatively accurate information could be extracted from the survey.

Finally, all of the firms were collected in groups based upon the Standard Industrial Classification system, plus some special grouping to be explained later in this study. With these existing and devised classifications, the economic impact of the firms' port-related business volumes can be presented.

Impact Calculations

The survey of firms discussed in the previous section provided the basis for the calculations of the economic impact of the Georgia ports upon the state. The port-related business volumes of the responding firms, when combined properly with the Georgia Input-Output Model, yield the final impact figures. These impact figures are given at two levels. First, the "Direct" figure is given, indicating the revenue, employment, personal income, and city/state/local taxes generated directly by each firm's port-related business activity. Following that are the "Total" impact figures. These figures indicate the *total* amounts of revenue, income, employment, and taxes which will be generated within the regional economy because of the initial "direct" impact. This process works through the "multiplier" mechanism of the Input-Output model and deserves some explanation.

Input-Output models, in general, are models which seek " . . . to take account of the interdependence of the production plans and activities of the many industries which constitute an economy. This interdependence arises out of the fact that each industry employs the outputs of other industries as its raw materials."[3/] The labor force is interpreted in this sense as a form of industry which sells labor services and has a final demand for outputs of other industries in the form of "consumption" of durable and nondurable commodities.

3/ William J. Baumol, Economic Theory and Operations Analysis, 3rd edition, Englewood Cliffs: Prentice-Hall, 1972, p. 504.

These inter-industry relationships are two bases for input-output models in general, and the Georgia Model specifically. The model ". . . has been used to compute a series of measures of the effects of additional sales on output, employment, and income in the State . . . (tracing) changes in industry sales and trade patterns . . . through a multiplier."[4/] Based on the state's economy in 1970 and the inter-industry relationships mentioned above, the "direct" levels of final demand (or business volume of the firms surveyed and which are port-related) have "total" effects through multipliers on income, revenues, employment, and taxes. The effects of different sectors of the economy vary also; for example, an increase of $1 spending on water transportation (increasing the output of the water transportation sector by $1) will indirectly increase output through the rest of the state's sector by an additional $1.72; meanwhile, an increase of spending on marine architectural services (increasing output in that sector by $1) will generate an additional $2.06 in output in other sectors of the economy. In other words, the multiplier in the water transportation sector is $2.72 while the multiplier in the architectural services sector is $3.06. There are various economic reasons for the different sectors having different multipliers; for a regional model it is primarily because for certain sectors more or less output is "exported" to other regions and the multiplier is diminished by that amount of output which is "exported." A more detailed discussion of this would digress from the goals of this study.

As noted above in the introduction to this chapter, there are different functional interpretations to be associated with firms producing different goods and services and, hence, the division between the port-services and the port-user categories. Having explored the underlying significance of the multipliers of the economic model, it is clear that the port-services firms are firms whose economic impact, both "direct" and "total," is more highly dependent upon the existence of the ports in Savannah and Brunswick because their port-related business could not be shifted to another port along the South Atlantic coast; all of those revenues would be "exported" from the state.

The port-users, however, are firms whose output is dependent to some degree on the ports for receipt of raw materials and for access to markets.

4/ William A. Schaffer, Eugene A. Laurent, and Ernest M. Sutter, Jr., Using the Georgia Economic Model, College of Industrial Management, Georgia Institute of Technology, 1972, p. 7.

Their dependence on the port is less dramatic in many cases than the port-service firms because many of the firms could receive their raw materials from other ports and by other modes of transportation; the costs in dollars and time could be greater under these circumstances, but the *total* economic impact would not be lost to the state, although some of the impact would "leak" out of the region by varying amounts, depending upon the particular industry, commodity, market, etc. Therefore, the economic impact of the port-user firms indicated below should be interpreted as a maximum limit of the *true* economic impact, which is a nonquantifiable figure lying somewhere below the limit.

As in the 1972 study, the economic impact is measured in revenue, personal income, employment, and city/state/local taxes, all of which are interrelated. However, the better evaluations of the economic impact of the ports on the state would be the employment and the personal income figures. Increases in these figures increase the spending power within the state and make for a healthy economy. The direct and total tax figures are also important to the state, but these are functions to some extent of the incomes generated in the state.

Table V-3 lists the major divisions in the port-service firms and describes the types of firms which are included in each classification. This table is

Table V-3

CLASSIFICATION OF PORT-SERVICE FIRMS

Land Transportation	Railroads, trucking firms, local cartage, warehousing.
Water Transportation	Steamship lines, marine terminal operator, dock facilities, stevedoring, towing, piloting.
Transportation Services	Freight forwarder, cargo and shipping bureaus, custom-house brokers, cargo surveyor, container leasing.
Marine Supplies and Services	Provide ship repairs, refueling provisions, electric equipment, and other supplies.
Auxiliary Marine Services	Maritime law, marine banking, marine insurance, advertising, marine architecture/engineering, dredging, and marine construction.
Government Services	U. S. Immigration, U. S. Coast Guard, Port Authorities, U. S. Corps of Engineers, U. S. Bureau of Customs, U. S. Department of Commerce, and U. S. Department of Agriculture.

followed by the economic impact of the port-services in Table V-4. Table V-5 shows the classifications of the port-user firms. These classifications are based on SIC groupings, and the products and export/import listings are based on survey findings. The economic impact of the port-users follows in Table V-6.

As can be seen in Table V-4, the total impact of the port-services on employment and income is 12,159 jobs and $183 million, respectively, and $20 million in city/county/state taxes. Land transportation provided the largest impact generating a total of $58.8 million of personal income. This was followed by auxiliary marine services and water transportation with $51.6 million and $30.3 million in personal income, respectively. The high level of auxiliary marine personal income generation can be attributed to the service orientation of the firms; there is much less required capital expenditures with such firms than with transportation companies, and, therefore, most of the revenues of such firms is transmitted into consumption goods and personal incomes. A useful relation to observe is that each dollar of direct revenue in the port-service classification generated 0.05 jobs, $0.81 personal income, and $0.09 taxes. These figures can be considered the multipliers in the overall port-service classification. Again note the high relationship between $1 direct revenue and the total personal income generated.

The total impact of the port-users on employment and income is 29,088 jobs and $416.9 million, respectively. (See Table V-6.) A total of over $64 million in city/county/state taxes is generated by the port-users. Not surprisingly, the textile industry accounts for the largest impact among the port-users with a total impact on personal income of over $139 million; a full 95% of this impact lies in the floor covering (carpet) section of textile products, which rely almost exclusively on ports for the receipt of jute for carpet backing. Textiles are followed by the paper industry, with almost $84 million of total personal income generated, and then chemicals, trade, and food products. The relative economic impact of the port-user firms can be shown with the multiplier calculations: for each $1 of direct, port-user revenue there are a total of 0.03 jobs, $0.48 of personal income, and $0.07 of taxes generated. Note that $1 direct revenue to a port-user generates less impact on the economic variables than $1 direct to a port-service firm ($0.48 versus $0.81). This is to be expected for two reasons: the port-services are by definition more directly

Table V-4

ECONOMIC IMPACT OF PORT-SERVICES, 1976

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Land Transportation	70,822	192,635	2,871	4,438	34,703	58,782	1,189	6,374
Water Transportation	36,464	99,183	1,478	2,285	17,867	30,265	612	3,282
Transportation Services	14,477	39,377	587	907	7,094	12,016	243	1,303
Marine Supplies and Services	16,853	45,840	683	1,056	8,258	13,988	283	1,517
Auxiliary Marine Services	59,346	174,542	766	2,193	26,711	51,577	2,376	7,542
Government Services[1/]	27,228	27,228	1,280	1,280	16,382	16,382	-	-
Total	225,190	578,805	7,665	12,159	111,015	183,010	4,703	20,018

1/ Payroll figures were used to represent revenue; employment figures are direct government employees only; income figures are direct government income only.

Source: EDD survey of firms and data from the Georgia Input-Output Model.

Table V-5

CLASSIFICATION OF PORT-USER FIRMS

Industry	Products	Exports/Imports
Field Crops	Peanuts, soybeans	Peanuts, soybeans
Food Products	Tea, coffee, poultry products, hides, beef products, sugar, feed	Tea, coffee, poultry products, feed, hides, machinery, beef products, sugar
Textile Mill Products	Thread, tire cord fabrics, industrial fabrics, dryer felts, textile piece goods, printed fabric, textile printing, yarn, fishnets	Thread, needles, tire cord fabric, textile machinery, yarn, textile piece goods, printed fabric, dye yarn, cordage
Floor Coverings	Carpet	Carpet, jute, wool fiber
Apparel Products	Men's suits, sport coats, sheets, drapes, diapers, canvas rainwear, boots, gloves, seat belts, hosiery	Textile fabrics, textile machinery, piece goods, machinery, cloth, seat belt components, hosiery
Lumber and Wood Products	Utility poles, creosote poles, lumber, doors, moldings	Utility poles, lumber, saws, knives, doors, moldings
Paper and Allied Products	Linerboard, folding cartons, bleached pulp, bleached board, paper bags, paperboard, stationery, paper cups, paper containers	Paperboard, machinery, pulp, chemicals, paper, folding cartons, solar salt, tall oil, stationery, paper cups, paper containers
Chemicals and Allied Products	Industrial chemicals, fertilizers, cellulose, gum rosin, synthetic resin, paint, trace minerals, rubber chemicals, health and beauty aids	Chemicals, cellulose, gum rosin, Chinese rosin, solvents, rubber chemicals
Petroleum Products	Asphalt roofing materials	Asphalt
Rubber, Plastics, and Leather Products	Latex, crepe rubber, beverage cases, TV parts, injected molded products	Raw materials, coating materials
Stone, Clay, and Glass Products	Portland cement, asbestos industrial yarn and fabrics, precast concrete, kaolin clay, glass and aluminum products, granite blocks and slabs, acoustical ceiling, gypsum wall	Portland cement, asbestos industrial yarns and fabric, steel bars, kaolin clay, glass, granite blocks and slaba, acoustical ceilings, gypsum wallboard, porcelain

Table V-5 (Continued)

Industry	Products	Exports/Imports
Stone, Clay, and Glass Products (Continued)	board, porcelain insulators, ceramic tile	insulators, ceramic tile
Primary Metal Industries	Iron castings, copper and aluminum wire and cable, prefab metal extrusions	Wire, cable, steel, copper, steel billets
Fabricated Metal Products	Fourdrinier wires, steel products, welding wires, steel doors, conveyors, aluminum cooking utensils, prefab steel buildings, irrigation systems, machine knives, lawn mower blades, mobile home frames, valves, stainless steel battery case	Fourdrinier wires, steel sheets, stainless steel rod, pressure vessels, conveyors, aluminum sheet, irrigation equipment, lawnmower blades, band saws
Machinery, except Electrical	Boiling machinery, chisel plows, farm equipment, earth moving machinery peanut shelling and separating equipment, textile machinery, poultry feeding and egg gathering equipment, industrial pumps, lawn mowers, sewing machines, construction equipment, nailing machines, beverage machinery, sawmill and paper mill machinery	Boiling machinery, harrow blades, chisel points, farm equipment, engines, tires, peanut shelling equipment, textile machinery, poultry feeding and egg gathering equipment, industrial pumps, lawn mowers, sewing machines, construction equipment, nailing machines, beverage machinery
Electrical Machinery	Telephone equipment, lighting fixtures, electronic components, AC motors, drive controls	Telephone equipment, lighting fixtures, electronic component parts, motors, drive controls
Transportation Equipment	Diesel engines and parts, mobile home running gear, aircraft, trailer axles, ambulances	Diesel engines and parts, axle springs, castings, aircraft, steel, ambulances, medical electronics
Instruments	Liquid meters and valves, antennas, satellite tracking equipment, test instruments	Meters, antennas, satellite tracking equipment, test instruments
Miscellaneous Manufacturing	Billiard tables, chalk, miscellaneous products	Chalk, miscellaneous products

Table V-5 (Continued)

Industry	Products	Exports/Imports
Wholesale and Retail Trade	-	Petroleum products, printed paper, gifts, office supplies, shelled peanuts, alcoholic beverages, decorations, miscellaneous items, shoes, forestry supplies, wall coverings, bicycles, steel, lumber, general merchandise, earth moving equipment, farm equipment, tires, antique furniture, construction equipment

Table V-6

ECONOMIC IMPACT OF PORT-USERS, 1976

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Field Crops	3,850	10,511	-	-	1,771	3,080	236	589
Food Products	48,476	118,910	804	1,633	10,522	25,746	488	3,393
Textile Mill Products	338,840	750,530	4,448	11,366	51,905	139,454	1,314	20,254
Floor Coverings	326,725	725,330	4,165	10,883	49,009	133,957	1,218	19,604
Apparel Products	17,739	45,766	975	1,479	7,096	12,772	94	1,242
Lumber and Wood Products	1,486	3,611	38	56	416	862	55	149
Paper and Allied Products	166,045	397,130	1,715	4,739	34,630	83,785	3,464	14,439
Chemicals and Allied Products	100,193	207,717	1,079	2,360	17,067	40,180	2,104	7,014
Petroleum Products	16,800	38,640	127	313	3,024	7,896	126	1,008
Rubber, Plastics, and Leather Products	1,649	3,744	37	66	495	924	27	115
Stone, Clay, and Glass Products	20,860	53,609	459	902	6,466	13,350	201	1,460
Primary Metal Industries	31,576	63,395	430	812	7,713	14,134	425	1,866
Fabricated Metal Products	33,398	74,477	591	1,095	9,685	18,035	437	2,338
Machinery, except Electrical	38,799	87,298	799	1,441	11,640	21,339	378	2,328
Electrical Machinery	4,981	11,686	82	181	667	2,740	35	300
Transportation Equipment	6,569	14,268	199	308	1,789	3,336	46	362
Instruments	4,380	9,899	81	159	1,095	2,278	43	263
Miscellaneous Manufacturing	1,495	3,573	45	74	463	882	26	120
Wholesale and Retail Trade	32,666	84,933	1,502	2,104	16,007	26,133	4,657	7,187
Total	869,802	1,979,697	13,411	29,088	182,451	416,926	14,156	64,427

Sources: EDD survey of firms and data from the Georgia Input-Output Model.

dependent upon the ports than are the port-user firms, and the port-services are, in general, more labor-intensive (versus capital-intensive), hence, the revenues flow to incomes rather than capital outlays.

VI. COMPARISON BETWEEN 1972 AND 1976 ECONOMIC IMPACT

The economic impact study presented in the previous section indicates the impact of Georgia's deepwater ports on the state for the calendar year 1976. The study is extremely similar in design to the 1972 economic impact study of the ports. Because of the structural similarities, a comparison can be made of the results of the two studies after some adjustments are made. The impacts in the 1972 and 1976 studies are represented in 1972 and 1976 dollars, respectively. This is obviously done because the activities of the ports, the port-services, and the port-users actually took place within the economic environment existing at the time of the studies. However, when attempting to compare these activities from one study to the next, it is necessary to establish a base period for both studies. This is even more crucial when comparing current economic data with data which pre-dates the increased levels of inflation which occurred in the 1974-1975 period.

In order to make the data more comparable, the 1976 economic impact figures have been adjusted by the appropriate price deflators. Both the port-users and port-services figures were corrected so that the impact figures are transformed into 1972 dollars. These adjusted figures are given in Tables VI-2 and VI-3. (In addition, the 1972 economic impact figures are given in Tables VI-4 and VI-5). Note that the 1976 revenue, income, and tax figures have been corrected for 1972 price levels, but the employment figures are the same. The reason for this is that the employment figures given are in absolute terms in both 1972 and 1976 rather than relative terms. The adjustment was already made when the employment figures were calculated using the employment-output ratios.

Table VI-1

SURVEY RESPONSES 1972 AND 1976

	Port-Services		Port-Users		Total		Ratio of Total
	1972	1976	1972	1976	1972	1976	1976-1972
Total firms surveyed	170	225	487	1,751	657	1,976	3.0
Number of respondents	126	159	253	456	379	615	1.6
Percent responding	74	71	52	26	58	31	-
Port-related firms with usable data	99	131	147	218	246	349	1.4

Table VI-2

1976 ECONOMIC IMPACT OF PORT-SERVICES IN 1972 DOLLARS

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Land Transportation	52,461	142,693	2,871	4,438	25,706	43,542	881	4,721
Water Transportation	27,010	73,469	1,478	2,285	13,235	22,419	453	2,431
Transportation Services	10,724	29,168	587	907	5,255	8,901	180	965
Marine Supplies and Services	12,484	33,956	683	1,056	6,117	10,361	210	1,124
Auxiliary Marine Services	43,960	129,290	766	2,193	19,786	38,205	1,760	5,587
Government Services	20,169	20,169	1,280	1,280	12,135	12,135	-	-
Total	166,808	428,745	7,665	12,159	82,234	135,563	3,484	14,828

Table VI-3

1976 ECONOMIC IMPACT OF PORT-USERS IN 1972 DOLLARS

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Field Crops	2,518	6,874	-	-	1,158	2,014	154	385
Food Products	32,887	80,672	804	1,633	7,138	17,467	331	2,302
Textile Mill Products	260,046	576,002	4,448	11,366	39,835	107,025	1,008	15,544
Floor Coverings	250,748	556,662	4,165	10,883	37,612	102,804	935	15,045
Apparel Products	14,552	37,544	975	1,479	5,821	10,477	77	1,019
Lumber and Wood Products	1,044	2,536	38	56	292	605	39	105
Paper and Allied Products	104,959	251,030	1,715	4,739	21,890	52,961	2,190	9,127
Chemicals and Allied Products	55,818	115,720	1,079	2,360	9,508	22,384	1,172	3,908
Petroleum Products	6,619	15,225	127	313	1,191	3,111	50	397
Rubber, Plastics, and Leather Products	1,132	2,570	37	66	340	634	19	79
Stone, Clay, and Glass Products	14,142	36,345	459	902	4,384	9,051	136	990
Primary Metal Industries	19,922	39,997	430	812	4,866	8,917	268	1,177
Fabricated Metal Products	21,071	46,989	591	1,095	6,110	11,379	276	1,475
Machinery, except Electrical	26,758	60,206	799	1,441	8,028	14,717	261	1,606
Electrical Machinery	3,751	8,800	82	181	502	2,063	26	226
Transportation Equipment	4,943	10,736	199	308	1,346	2,510	35	272
Instruments	2,972	6,716	81	159	743	1,545	29	178
Miscellaneous Manufacturing	1,032	2,466	45	74	320	609	18	83
Wholesale and Retail Trade	22,544	58,615	1,502	2,104	11,047	18,035	3,214	4,960
Total	596,710	1,359,043	13,411	29,088	124,519	285,504	9,303	43,833

Table VI-4

1972 ECONOMIC IMPACT OF PORT-SERVICES (REVISED)

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Land Transportation	57,520	156,454	3,158	4,880	28,185	47,741	966	5,177
Water Transportation	34,817	94,702	1,911	2,954	17,060	28,898	585	3,134
Transportation Services	7,196	19,573	395	610	3,526	5,973	121	647
Marine Supplies and Services	13,210	28,381	407	674	4,200	7,159	635	1,391
Auxiliary Marine Services	8,896	26,243	143	430	4,092	7,828	377	1,156
Government Services	6,206	16,757	286	286	6,206	6,206	0	496
Total	127,845	342,110	6,300	9,834	63,269	103,805	2,684	12,001

Sources: IDD survey of firms in 1972 and data from the Georgia Input-Output Model.

Table VI-5

1972 ECONOMIC IMPACT OF PORT USERS (REVISED)

	Revenue ($000)		Employment (number)		Personal Income ($000)		City/County/ State Taxes ($000)	
	Direct	Total	Direct	Total	Direct	Total	Direct	Total
Field Crops	16,293	44,480	-	-	7,495	13,034	1,000	2,281
Food Products	18,266	43,156	441	907	4,063	9,390	191	1,258
Textile Mill Products	131,234	287,768	3,156	6,375	25,702	58,016	644	7,820
Floor Coverings	94,963	210,818	1,577	4,121	14,244	38,935	342	5,698
Apparel Products	3,850	9,933	258	391	1,540	2,772	20	270
Lumber and Wood Products	4,724	11,479	170	283	1,323	2,740	188	472
Paper and Allied Products	81,266	191,800	1,123	3,413	17,065	40,635	1,828	7,312
Chemicals and Allied Products	17,913	37,447	349	766	3,085	7,284	365	1,254
Petroleum Products	6,715	15,445	128	318	1,209	3,156	50	403
Rubber, Plastics, and Leather Products	409	928	14	25	124	230	6	29
Stone, Clay, and Glass Products	21,143	54,338	685	1,349	6,554	13,531	201	1,480
Primary Metal Industries	8,779	16,349	178	319	1,948	3,463	91	446
Fabricated Metal Products	27,278	60,830	766	1,418	7,911	14,730	355	1,909
Machinery, except Electrical	19,972	44,937	596	1,076	5,992	10,985	212	1,198
Electrical Machinery	8,550	19,183	254	461	2,456	4,703	90	559
Transportation Equipment	2,544	4,716	43	84	569	998	30	126
Instruments	360	814	10	19	90	187	3	22
Miscellaneous Manufacturing	6,620	15,822	287	474	2,052	3,906	113	530
Wholesale and Retail Trade	26,934	70,028	1,795	2,513	13,198	21,547	3,838	5,925
Total	402,850	929,453	10,253	20,191	102,376	211,307	9,225	33,294

Sources: IDD survey of firms in 1972 and data from the Georgia Input-Output Model.

The Surveys

Before the actual comparison of the impact figures is made, the structural differences of the actual surveys should be analyzed. Table VI-1 reproduces both the 1972 and 1976 survey details. Although three times the number of firms were surveyed in the 1976 study, only 60% more replies were received, and 40% more had usable data. Evidently the great bulk of port-related firms had been contacted in the 1972 study and diminishing marginal returns were realized as the number of firms surveyed increased. The increase in the number of firms surveyed can be attributed to two reasons. First, there are simply more firms in Georgia engaged in international markets in 1976 than in 1972. The number of firms which indicated an international market in the Georgia Manufacturing Directory increased. In fact, there are 49 firms shown in the 1976 Directory which have an international market but were not established until 1973 or later. This does not include those firms whose markets were local, regional, or national in 1972 and expanded to international by 1976; this number could be significant. However, an indication by a firm of an international market need not mean that the firm is port-related. Second, an extensive list of firms, farms, and co-ops was used in the agricultural sector. This portion of the 1976 survey is different from the 1972 study because it was felt that agricultural products have grown in importance in international trade and it was felt that there could be some impact through the deepwater ports. All of these firms were contacted from a list obtained from the International Division of Georgia's Department of Agriculture. From Table V-2 in the previous section, it can be seen that only a small percentage of agricultural firms responded. This is interpreted to mean either that most of the firms do not know where their crops or livestock go since they work through co-ops or brokers, or they do not use the Georgia ports. Also, there are other ports in the Southeast with grain elevators and dry bulk storage areas and, although they are under construction, there are no such facilities currently in use in Georgia's ports.

Therefore, the absolute number of respondents is higher in 1976 even though the percentage is lower, and the number of responses with usable data is higher in 1976. An implication from all of this is that the total economic impact of Georgia's deepwater ports should be higher. More firms were surveyed and responded, more firms have entered the international markets, and the dollar volume of business should be higher for no other reason that that price

levels have risen. After adjustments for price changes, let us examine the impact figures and determine what the differences indicate.

The Impacts

The economic impact of the deepwater ports appears to be substantially greater in 1976 than 1972 (in constant 1972 dollars). Both port-service and port-user firms indicate increases in each category: revenue, employment, income, and taxes. In constant dollars (1972) total personal income generated by port-services grew from $103.8 million to $135.6 million, an average annual rate of growth of 6.9%; employment and taxes registered an annual rate of growth of 5.4%, employment increasing from 9,834 to 12,159 total jobs generated by port-related business. Total revenue for port-services increased from $342 million to $428 million (1972 dollars), a 5.8% annual growth rate. As will be seen below, the increase in port-users' impact grew at a much higher rate. There are several probable reasons for this. First, an estimate was used for 26 truck lines which did not respond to the 1972 survey, an estimate based on the average impact of the truck lines which did respond. Since this procedure was not used in the 1976 impact figures, the land transportation impact in the 1972 figures may be slightly overstated, and, thus, would decrease the average rate of growth figure. Second, since we are dealing in constant terms, the similar impact figures would indicate that a substantially consistent group of firms were contacted and responded to the survey and, in constant terms, were maintaining their levels of business activity. Third, because of the nature of container and bulk freight, an increase in business by a port-user would not require the same increase in business by the port-service firm; you would expect a proportional increase, but not necessarily a one-to-one increase.

There were several areas in port-services which enjoyed substantial gains from one study to the next. The firms in "Auxiliary Marine Services" indicate substantial growth; it will be recalled that these firms include insurance, law, banking, architecture, and construction services. Also, recall that such services have relatively high multipliers such that $1 revenue generates more personal income than $1 revenue in a more capital-intensive industry. In addition, marine law, banking, and insurance firms' business volumes are more highly sensitive to port traffic than are some of the other more "hardware-oriented" port services, and as we shall see, port-user activity registered substantial gains. Another category of firms which are more highly sensitive to overall port

activities are the government services. This sector has also grown in employment and income generation, increases which can be attributed primarily to structural changes within some of the government services, plus more complete survey responses.

A rational approach to the economic impact or influence of a port over time would be that the true growth of impact would lie not in what is considered port-services, although the impact of these firms is vitally important to the local economies where the ports are located; rather, the growth in the number of firms which use and depend upon the ports and the amount of freight which moves through the ports should be the real key to the growth rate. If this is indeed the correct approach, then the activities of the port-user firms indicate a substantial increase in the economic impact of Georgia's deepwater ports. In constant 1972 dollars, the port-users' impact on total personal income increased from $211.3 million to $285.5 million, an average annual rate of growth of 7.8%. Employment figures jumped from 20,191 to 29,088, a 9.6% rate of growth annually. Total tax revenues to cities, counties, and the state increased at a 7.1% annual rate from $33.3 million to $43.8 million total. Total revenues generated increased from 1972 to 1976 at an annual rate of growth of 10%, from $929.5 million to $1.359 billion.

There have been negative influences upon business and port activity because of the slump of 1974-1975. Since the ports open the way to the world economy and since the entire world economy slowed during that period, activity levels were also depressed. The impact figures, therefore, probably exhibit a slower growth pattern than would have been the case with a healthy world economy. Many industries, particularly those which are highly dependent upon petroleum, not only experienced slower growth, but experienced sharp declines in business activity. Some of the increases, therefore, in the impact figures indicate recovery from these sharp declines plus some net growth.

The impacts on revenues are highest in the textile and paper industries in the 1972 study, the 1976 study, and the 1976 study in 1972 dollars. The next three places shift from one study to the next between chemicals, trade, food products, machinery, and fabricated metal products. Textile mill products which were made up almost completely of the floor covering (carpet) industry, show a large increase in relative and absolute impact on personal incomes of the state, $58 million to $107 million (1972 dollars). Paper and allied

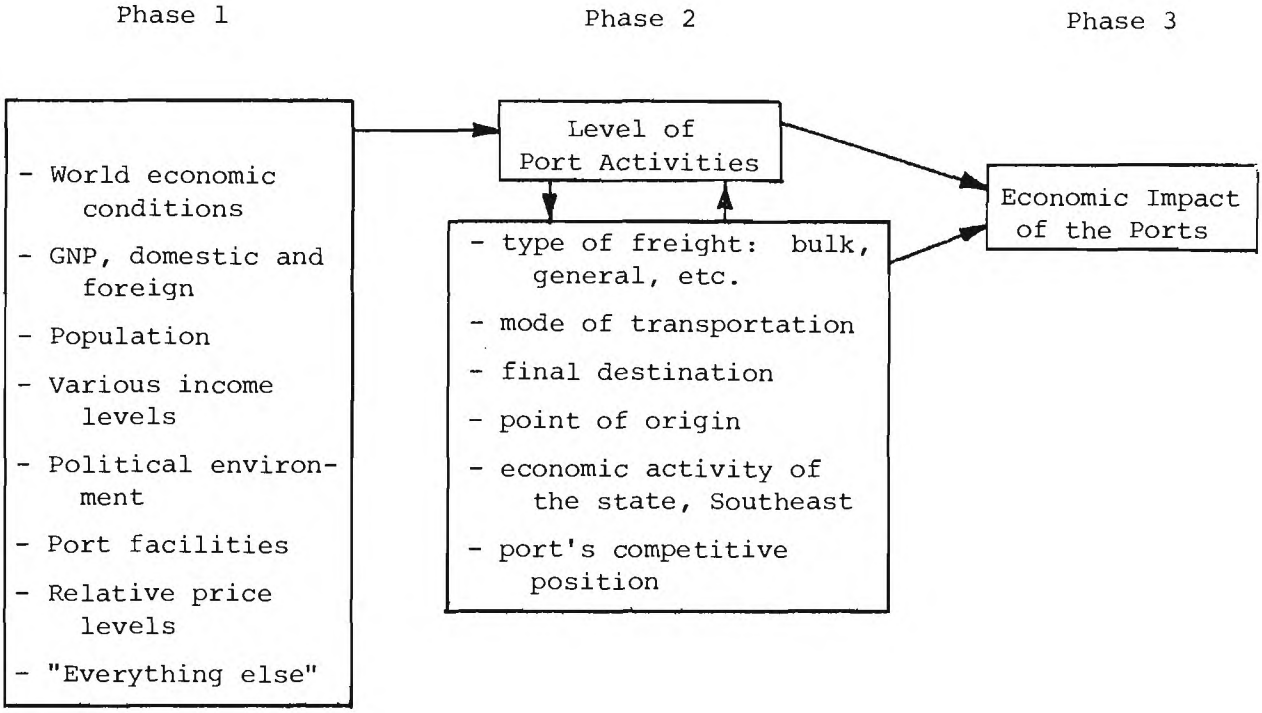
products' impact on incomes, meanwhile, increased from $40.6 to almost $53 million, and chemicals from $7.3 to over $22 million in total personal income.

In conclusion, the impacts in all four areas increased at a greater rate among the port-user firms than among the port-service firms: 7.8% versus 6.9%, for example, in annual growth of total personal incomes generated, 9.6% versus 5.4% in employment, 7.1% versus 5.4% in taxes, and 10.0% versus 5.8% annual growth rate in total revenues. This variance is to be expected because a one-to-one relationship between port-services growth and port-user growth should not be expected for any reason; in fact, one would think that more rapid growth by port-users to be quite a healthy environment for the local port areas and the state.

VII. TRAFFIC PROJECTIONS AND COMPETITIVE POSITION

Future economic impacts of Georgia's deepwater ports cannot be calculated directly because of the many variables involved, and isolating the effects of any one or several variables on the impact of Georgia's economy is not satistically valid; there are simply too many independent forces at work in the system.

It is possible, however, to estimate the future traffic movements through the ports with some degree of confidence. This is a more direct process than calculating impacts, and, even through future impacts are not specifically calculated or implied, the relative levels of activities in the ports can serve as guidelines for decision makers and planners. The chart below indicates some of the variables involved in the process and a simplified flow of causes and effects. This mish-mash of activities in Phase 2 is the source of the breakdown in projecting economic impact. However, one of the inputs to the economic impact, the level of port activities, can be projected with some relevance by looking at the various factors which determine the level (population, income, GNP, etc.) and basing the projections upon those determining factors.



Georgia's Ports

Of the general factors which influence import and export demand, there are only a few which can be projected, and Gross National Product (foreign and domestic), population growth and personal income levels are the most prominent. Based upon rates of growth and changes in these rates, future levels can be estimated for these variables. By analyzing the past relationships between these variables and the levels of imports and exports through Georgia's ports, future relationships can be estimated.

Table VII-1 contains the population and personal income figures for Georgia, the Southeast, and the United States. In addition, the annual rates of growth are presented. As can be seen, Georgia and the United States are anticipated to have approximately the same rate of population growth through 1980, but from 1980 to 1990 Georgia's population will grow at a more rapid rate than that of the Unites States or the Southeast. Although the rate of growth of personal income annually for Georgia during the next decade will be slightly lower than the rate from 1971-1980, it will be higher than the annual rate of personal income growth for the Southeast and the United States. With the increasing levels of personal income in the state and the Southeast should come an increase in demand for goods and services, both foreign and domestic. This is interpreted as a positive growth signal for Georgia's ports which can be the source of supply of the desired goods and services. In addition to consumer demand, the increased number of firms involved in international markets as indicated in Map 1 of Section II will need more raw materials and intermediate goods to meet their production needs. These firms will also use the ports for access to foreign and domestic markets.

The role of foreign markets and economies is vital to the health of the United States' international trade. If the foreign economies are healthy themselves, their demands for imports (exports from the U. S. and other world markets) are higher. This is analagous to the healthy economy and income levels of Georgia and the Southeast and their demands for imports. If foreign incomes and economies (measured in Gross National Product) are growing, the levels of port activities are higher because of the increased levels of exports from this country. Since the European Economic Community (EEC) accounted for about 50% of the exports from Georgia's ports in 1976, the level of GNP for EEC and the relative price index (price of imports related to price of exports) were tested,

Table VII-1

POPULATION AND PERSONAL INCOME FOR GEORGIA,
THE SOUTHEAST, AND THE UNITED STATES

Population

	Population (000)			Average Annual Rate of Growth (%)	
	1975[1]	1980[2]	1990[2]	1975-1980	1980-1990
Georgia	4,926	5,147	5,907	0.9	1.4
Southeast[3]	47,773	49,827	56,373	0.8	0.6
United States	213,121	223,532	246,039	0.9	1.0

Personal Income

	Personal Income ($ million - 1967)[2]			Average Annual Rate of Growth (%)	
	1971	1980	1990	1971-1980	1980-1990
Georgia	14,205	21,011	31,940	4.6	4.2
Southeast	130,952	197,991	295,565	4.7	4.1
United States	730,631	1,068,496	1,517,173	4.3	3.6

1/ U. S. Department of Commerce, Bureau of the Census, "Population Estimates and Projections," Current Population Reports, Series P-25, No. 640, November 1976.

2/ U. S. Department of Commerce, Social and Economic Statistics Administration, Bureau of Economic Analysis, 1972 OBERS Projections - Economic Activity in the U. S., Vol. 4, April 1974.

3/ The Southeast includes Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas.

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and the GNP variable was found to be significant in explaining the level of exports for both Brunswick and Savannah.

Population and GNP projections, current levels, and annual growth rates for the European Economic Community are indicated in Table VII-2. Note that the United Kingdom is not included in the EEC even through it is one of the major importers of goods from Georgia's ports. The reason for this is that the United Kingdom was not a member of the EEC until January 1, 1973; consequently, its GNP was not included in the 1972 calculations. To maintain consistency the United Kingdom figures are not being added to the EEC figures for

Table VII-2

POPULATION AND GROSS NATIONAL PRODUCT FOR THE EUROPEAN ECONOMIC COMMUNITY[1/]

	1975	1980	1990	Annual Growth Rate (percent) 1975-1980	1980-1990
Population (in thousands)	194,363	200.3	210.8	0.6	0.5
GNP (in billions of 1968 dollars)	612.1	716.5	981.7	3.2	3.2

1/ EEC includes Germany, France, Italy, the Netherlands, Belgium, and Luxembourg.

Sources: World Bank Atlas: Population, Per Capita Product, and Growth Rates, World Bank, 1976; International Financial Statistics, International Monetary Fund, May 1975, April 1977; Worldcasts Regional, Predicasts, April 1977; International Economic Indicators, U. S. Department of Commerce, March 1977; Petroleum Economist, January 1976.

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the calculations; otherwise, the method of projections in the 1972 study would not be comparable to the current projections. The population projections are not markety different from the 1972 study, except for a slightly lower projected average annual rate of growth.

Just as in the 1972 impact study, tonnage projections are broken down into total, domestic, imports, and exports for both Brunswick and Savannah because it is felt that due to the different types of freight, different factors will influence the rates of growth of each type. The domestic tonnage (commercial movements between points in the U. S., Puerto Rico, and the Virgin Islands) was regressed on the income levels of the state, the Southeast, and the U. S. and a trend variable which relates the level of tonnage to each year over time. The trend variable was significant for Brunswick, and the state personal income level and the trend variable were both significant in explaining domestic tonnage in Savannah.

Import tonnage through Georgia's ports would be a function of the level of economic activity in the state, Southeast, and U. S., and the relative price levels of domestic versus foreign goods; a trend variable was also tested. It was found that the trend variable was significant for Brunswick's level of

imports and the southeastern personal income level was the best to explain Savannah's level of imports.

Likewise, the level of exports from Brunswick and Savannah should be explained by relative prices between foreign and domestic goods and/or the economic health of the foreign country, measured in GNP. For both ports the level of GNP of the EEC was found to be significant.

In addition to the source of the domestic, import, and export tonnages, a projection was made for the total tonnages handled by the ports using trend and income variables. For Brunswick the trend variable was significant and the southeastern personal income was significant for Savannah.

Table VII-3 contains the results of the regression analyses in the form of tonnage projections in thousands of short tons for both ports and each type of freight (domestic, import, export), plus a total projection for each port. The results indicate that Brunswick will handle between 1,662,000 and 1,750,000 tons of freight in 1980 and between 2,193,000 and 2,339,000 tons in 1990; this means that Brunswick will average an annual growth rate of between 2.9% and 3.3% from

Table VII-3

FREIGHT TRAFFIC PROJECTIONS FOR THE BRUNSWICK AND SAVANNAH PORTS
(in thousands of short tons)

Port	1975	1980	1990	1975-1990 Average Annual Growth (%)
Brunswick, Total	1,430	1,662	2,193	2.9
Brunswick, Sum	1,430	1,750	2,339	3.3
Domestic	541	567	704	
Exports	28	313	485	
Imports	861	870	1,150	
Savannah, Total	7,593	9,523	13,583	3.9
Savannah, Sum	7,593	10,298	15,495	4.9
Domestic	2,690	4,082	6,673	
Exports	1,782	2,265	3,261	
Imports	3,121	3,951	5,561	

Source: 1975 -- United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlantic Coast; 1980, 1990 -- EDD projections.

1975 to 1990. The results show Savannah will handle from 9,523,000 to 10,298,000 tons in 1980 and between 13,583,000 and 15,495,000 tons in 1990. This indicates that Savannah will have an average annual growth rate between 3.9% and 4.9% in the same 15-year period.

The major differences in the levels of the current projections are in the levels of GNP and their expected average annual rate of growth. In the previous study the future GNP growth rate was projected to be about 4.8% per year. In this current study, however, projections ranged from 3.2% to 3.8%, all of which are substantially lower than the previous 4.8 level. The explanation for the depressed levels of growth is based almost entirely upon energy demands and supplies. In order for the EEC to reach its goal of 50% energy-independence, economic growth will be constrained by a 3.2%-3.5% rate of growth. Any variation from this rate, it is felt, will be primarily because of a demand/supply shift in the world energy market. For the purposes of this study the conservative 3.2% level was used so that the freight projections which are given will be conservative.

However, as shown in the accompanying tables, despite the somewhat depressed economic activity in EEC, the levels of activity in Georgia's ports are not uniformly lower. For example, Brunswick's projected rate of growth annually has dropped from a range of 3.7%-4.7% to the above 2.9%-3.3% average. On the other hand Savannah's range of growth has inched up from 3.6%-4.5% average annual rate to 3.9%-4.9%.

Georgia Ports Authority Facilities

In addition to the overall port activities of Brunswick and Savannah, projections were made for Georgia Ports Authority facilities at each port. Again, personal incomes of Georgia, the Southeast, and the United States and a trend variable were tested. The trend variable was significant for Savannah GPA facilities. Table VII-4 indicates the projected levels of tonnage in thousands of short tons in fiscal years 1980-1981 and 1990-1991. Brunswick GPA facilities are projected to handle 243,000 tons in 1980-1981 and 349,000 tons in 1990-1991. Savannah GPA facilities are projected to handle 4,054,000 tons in 1980-1981 and 6,435,000 tons in 1990-1991. Brunswick and Savannah GPA facilities are shown to have average annual rates of growth of 8.4% and 6.1%, respectively, between fiscal year ending 1976 and 1991.

Table VII-4

FREIGHT TRAFFIC PROJECTIONS FOR GEORGIA PORTS AUTHORITY FACILITIES AT BRUNSWICK AND SAVANNAH
(in thousands of short tons)

	Fiscal Years		
	1975-1976	1980-1981	1990-1991
Brunswick GPA Facilities	104	243	349
Savannah Facilities	2,642	4,054	6,435

Source: 1975-1976 -- Report of Operations, Georgia Ports Authority, Fiscal Year Ending June 30, 1976; 1980-1981 and 1990-1991 -- EDD projections.

These figures, however, can be interpreted to be more variable than total port figures. The reason for this is that a great deal of construction has recently been completed or due for completion soon and the impact of these new GPA facilities, such as the grain elevator, new container cranes and berths, warehouses, etc., is not indicated in the 1976 figures nor in the regression equations. With the currently available information, however, it is anticipated that GPA tonnages will show increases in excess of the above growth patterns, but the actual levels of increases are indeterminate.

Competitive Position

In addition to levels of domestic income, foreign GNP's, and relative price indices, the level of port activity in Savannah and Brunswick will be a function of their competitive positions with other American ports, in general, and South Atlantic ports, in particular. The degree of competitiveness, of course, cannot be measured or predicted with any relevance. However, highlights of the current facilities can be informative.

Table VII-5 indicates the 1976 container facilities and activities of the ports of Charleston and Jacksonville along with Savannah. As can be seen in the table, Charleston and Jacksonville offer substantial competition to Savannah's container trade. It should be noted that Savannah did not have a full year's container operation until 1973, and has shown rapid growth in this area. The impact of recent completions of future container facilities are not yet

available. However, container movements should continue growing at a high rate. It is estimated that an additional 269 intermodal ships with a capacity for another 156,000 TEU's are under construction or on order and are to be in service by 1980. This will be a 25% increase in the current container carrying capacity of 630,000 TEU's.[1/]

Table VII-5

CONTAINER FACILITIES AND ACTIVITY AT SAVANNAH, CHARLESTON, AND JACKSONVILLE

Port	Container Berths	Length (feet)	Number of Conatiners in 20-Foot Equivalent Units (TEU's) 1975 (actual)	1976 (estimate)	1977 (forecast)
Savannah[1/]	4	2,377	64,500	75,000	-
Charleston	5	4,500	139,500	165,000	185,000
Jacksonville[2/]	4	3,000	131,300	141,800	153,100

1/ Two of the four berths were not in operation until April and June 1977.

2/ These figures include two berths and 1,200 feet operated by Sealand.

Sources: "Annual Containerports Survey, 1976," Container News, December 1976; and EDD survey.

Another source of competition is in grain exporting. Charleston currently has a grain elevator in operation and Savannah's Ocean City Terminal grain elevator is to be completed Fall 1977. It is anticipated that the presence of a grain elevator will be a positive factor in competition among ports in the future. Net grain exports from the United States have steadily increased over the past few years. Table VII-6 shows that net exports have grown from 39.8 million metric tons in the base period of 1969-1971 to 84.1 million tons in 1975. This figure is anticipated to grow at an annual rate of 2.9% until 1985 to a 111.8 million ton level.

The overall competitive position for a port in the future is going to depend not only on its capacities for handling general cargo and warehousing, but on its capacities to handle the newer and more specialized forms of general

1/ "The State of Containerization, 1977," Transport 2000, January/February 1977.

Table VII-6

NET GRAIN EXPORTS OF THE UNITED STATES
(in millions of metric tons)

	1969-1971 Average	1975	1985 (projected)
Net Exports	39.8	84.1	111.8

Source: U. S. Department of Agriculture, Economic Research Service, World Economic Conditions in Relation to Agricultural Trade, June 1976.

and bulk cargo traffic: dry bulk and grain elevator facilities, container berths, LASH (lighter aboard ship) facilities, liquid bulk facilities.

Appendix 1-A

BRUNSWICK PORT FREIGHT TRAFFIC, 1950-1976
(in thousands of short tons)

	Total	Domestic	Foreign	Exports	Imports
1950	131.3	131.3	-	-	-
1951	151.6	151.4	0.2	-	0.2
1952	209.6	194.5	15.1	15.1	-
1953	218.9	216.2	2.7	0.9	1.8
1954	202.3	196.5	5.8	5.8	-
1955	205.6	203.8	1.8	1.8	-
1956	230.1	214.5	15.6	1.0	14.6
1957	407.7	303.4	104.2	0.8	103.4
1958	404.8	312.9	91.9	1.4	90.5
1959	542.1	353.2	188.9	4.0	184.9
1960	787.3	339.1	448.2	22.6	425.6
1961	704.3	278.8	425.5	26.7	398.8
1962	720.7	317.7	403.0	38.9	364.1
1963	964.2	379.9	584.3	66.6	517.7
1964	947.1	396.7	550.4	63.4	487.0
1965	857.6	356.1	501.5	50.0	451.5
1966	870.6	360.1	510.5	43.9	466.6
1967	979.9	395.0	584.9	90.1	494.8
1968	1,010.9	393.5	617.4	106.4	511.0
1969	1,086.6	383.3	748.3	120.7	627.6
1970	1,053.2	370.2	683.0	136.4	546.6
1971	1,059.1	423.8	635.3	98.7	536.6
1972	1,263.1	552.6	710.5	72.1	638.4
1973	1,393.7	625.9	767.8	46.7	721.1
1974	1,965.8	772.2	1,193.6	38.1	1,155.4
1975	1,430.4	541.1	889.3	28.2	861.1
1976	1,685.8	812.2	873.6	22.4	851.2

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlanta Coast.

Appendix 1-B

SAVANNAH PORT FREIGHT TRAFFIC, 1950-1976
(in thousands of short tons)

	Total	Domestic	Foreign	Exports	Imports
1950	3,471.2	1,812.7	1,658.5	248.1	1,410.4
1951	3,557.9	1,894.7	1,663.2	260.5	1,402.7
1952	3,571.9	1,609.4	1,962.5	262.9	1,699.6
1953	3,782.6	1,956.2	1,826.4	188.1	1,638.3
1954	3,751.8	1,876.7	1,875.1	357.5	1,517.6
1955	4,220.3	1,892.6	2,327.7	519.3	1,808.4
1956	4,157.0	1,700.5	2,456.5	547.1	1,909.4
1957	4,210.4	1,610.0	2,600.4	590.7	2,009.7
1958	4,086.9	1,784.9	2,302.0	367.6	1,934.4
1959	4,181.2	1,758.4	2,422.8	460.7	1,962.1
1960	4,325.2	1,811.0	2,514.2	615.5	1,898.7
1961	4,115.9	1,639.8	2,476.1	654.2	1,821.9
1962	4,558.4	1,974.1	2,584.3	587.8	1,996.5
1963	4,110.8	1,581.6	2,529.2	611.6	1,917.6
1964	4,157.5	1,446.2	2,711.3	772.0	1,939.3
1965	4,452.3	1,686.1	2,766.2	688.2	2,078.0
1966	4,756.7	1,868.3	2,888.4	799.7	2,088.7
1967	4,780.6	2,032.7	2,747.9	884.3	1,863.6
1968	6,025.5	2,561.3	3,464.2	1,147.3	2,316.9
1969	5,800.5	2,534.4	3,266.1	1,036.9	2,229.2
1970	6,810.8	2,676.1	4,134.7	1,398.2	2,736.5
1971	7,231.9	2,772.5	4,459.4	1,301.6	3,157.8
1972	8,037.2	3,010.3	5,026.9	1,376.7	3,650.2
1973	8,980.2	3,161.4	5,818.8	1,766.4	4,052.4
1974	9,698.7	3,465.5	6,233.2	1,981.2	4,252.0
1975	7,593.3	2,690.3	4,903.0	1,782.0	3,121.0
1976	9,187.8	3,236.1	5,951.7	1,962.6	3,989.2

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States, Part 1: Waterways and Harbors, Atlantic Coast.

Appendix 2-A

COVER LETTER

Dear Sir:

The Economic Development Laboratory at Georgia Tech, in cooperation with the Georgia Ports Authority, is performing a study of the Savannah and Brunswick ports to determine their contributions to the Georgia economy.

We are contacting firms such as yours to gather information to determine the present contribution of the ports, their growth, and their future needs. This information is of critical importance to the study.

Your firm may have been contacted in 1973 for a similar study; we wish to thank you both for the helpful replies and for the high rate of response we received then. This is a new, expanded study to revise and update the previous information which was gathered.

Would you please answer the questions on the reverse side of this letter and return in the enclosed envelope? Note that all information will be held in strict confidence; your figures will be reported only within a classification and not as an individual, identifiable firm.

Your cooperation will be greatly appreciated.

Sincerely,

Ross W. Hammond, Chief
Economic Development Laboratory

RWH:jes

Appendix 2-B

PORT-USER FORM

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976? _____

2. Approximate yearly payroll in 1976? $_____

3. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

4. Approximate 1976 sales volume? $_____

5. Please estimate the percent of 1976 sales volume stated above that is dependent upon the Brunswick/Savannah ports for the receipt of raw material or for access to markets. _____%

6. How would you describe your firm's main product?

_____

7. Please list your firm's:

   a) major exports _____

   b) major imports _____

8. Please indicate port(s) used instead of or in addition to Brunswick/Savannah.

   _____ Hampton Roads _____ Jacksonville

   _____ Wilmington _____ Mobile

   _____ Charleston _____ Other, (please specify) _____

9. Please indicate reason for using this port (Question 8).

   _____ lower freight costs to the port

   _____ better port facilities (please specify) _____

   _____ better schedule of vessel arrivals/departures

   _____ Other (please specify) _____

Appendix 2-C

PORT-SERVICE FORM

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976? _____

2. Approximate yearly payroll in 1976? $_____

3. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

4. Approximate 1976 business volume? $_____

5. Please estimate the percent of 1976 business volume stated above that is related to port business or waterborne commerce. _____%

6. How would you describe your firm's main activity as related to local waterborne commerce?

_____ Steamship agency

_____ Towing, pilot, launch service

_____ Terminal operator

_____ Stevedoring

_____ Salvage

_____ Dredging

_____ Freight forwarder or broker

_____ Marine supplier

_____ Container and chassis leasing

_____ Other (please specify) _____

Appendix 2-D

TRUCK LINE - BRUNSWICK

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976 at Brunswick terminal? _____

2. Approximate yearly payroll in 1976 of Brunswick terminal? $_____

3. Approximate state and local taxes paid in 1976 by Brunswick terminal (exclude workmen's compensation)? $_____

4. Approximate Georgia Fuel Tax paid in 1976 by Brunswick terminal? $_____

5. Approximate 1976 business volume at Brunswick terminal? $_____

6. Approximate percent of Brunswick terminals' business which originated or terminated at the Brunswick Port? _____%

Appendix 2-E

TRUCK LINE - SAVANNAH

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976 at Savannah terminal? _____

2. Approximate yearly payroll in 1976 of Savannah terminal? $_____

3. Approximate state and local taxes paid in 1976 by Savannah terminal (exclude workmen's compensation)? $_____

4. Approximate Georgia Fuel Tax paid in 1976 by Savannah terminal? $_____

5. Approximate 1976 business volume at Savannah terminal? $_____

6. Approximate percent of Savannah terminals' business which originated or terminated at the Savannah Port? _____

Appendix 2-F

RAILROAD FORM

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976 in Georgia? _____

2. Approximate yearly payroll in 1976 in Georgia? $_____

3. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

4. Approximate 1976 business volume in Georgia? $_____

5. Total origins and total destinations of freight traffic in Georgia in 1976. _____

6. Total origins and total destinations of freight traffic crossing the piers at Brunswick and Savannah in 1976. _____

Appendix 2-G

BANKING FORM

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in your foreign banking department in 1976? _____

2. Approximate yearly payroll of foreign banking department in 1976? $_____

3. Approximate 1976 business volume of foreign banking department? $_____

4. Approximate bank employment in 1976? _____

5. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

6. Please estimate the percent of your foreign banking business which is related to the ports of Brunswick and/or Savannah. _____%

Appendix 2-H

INSURANCE FORM

PORTS ECONOMIC IMPORT QUESTIONNAIRE

1. Approximate number of employees in 1976? _____

2. Approximate yearly payroll in 1976? $_____

3. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

4. Approximate 1976 business volume? $_____

5. Please estimate the percent of your business represented by marine insurance and other port related business. _____%

Appendix 2-I

LAW FORM

PORTS ECONOMIC IMPORT QUESTIONNAIRE

1. Approximate number of employees in 1976? _____

2. Approximate yearly payroll in 1976? $_____

3. Approximate state and local taxes paid in 1976 (exclude workmen's compensation)? $_____

4. Approximate 1976 business volume? $_____

5. Please estimate the percent of your practice which dealt with maritime law and other port-related business. _____%

Appendix 2-J

GOVERNMENT AGENCY FORM

PORTS ECONOMIC IMPACT QUESTIONNAIRE

1. Approximate number of employees in 1976? _____

2. Approximate yearly payroll in 1976? $_____

3. Please estimate the percent of your employment as payroll which is related to the Georgia Port business or water-borne commerce. _____%

Appendix 3

FREIGHT TONNAGE REGRESSION EQUATIONS

Due to the nature of the data and the erratic behavior of the economics of the United States and its trading partners as a result of the 1974-1975 recession, when regression analysis was employed using the appropriate data, the correlation coefficient was lower than the 1972 study in every case. This indicated to researchers that a more significant projection could be made if the regression equations from the 1972 study were used in conjunction with the current independent variables (personal incomes, trend variables, etc.) rather than using the new, but less significant, regression equations.

The following regression equations were constructed to estimate future freight tonnages at the Brunswick port, Savannah port, and Georgia Ports Authority facilities. The variables assumed to affect the tonnages handled would depend upon the type of cargo movement (i.e., domestic, export, import). In general, the variables tested were personal income of Georgia, the Southeast, and the nation; relative prices, where pertinent; and time. Stepwise regression analysis was employed, and direct and partial correlations between tonnages and the above variables were calculated. The separate contributions of each variable were analyzed and if the F-ratio was not significant at the $F_{0.01}$ level, the variable was rejected. Shown with each regression equation is its correlation coefficient and standard error of estimate. Also shown in parentheses under each coefficient in the regression equations is its standard error. See Section VII in the text for the future values of the variables needed for the following equations to project tonnages.

Brunswick Domestic Freight

$$Y = 150 + \underset{(1.36)}{13.51}\ X_2$$

where Y is domestic tonnage in thousands of short tons

X_2 is year (1950 = 1, etc.)

$r^2 = .91$ Standard error of estimate = 43

Savannah Domestic Freight

$$Y = 330 + \underset{(.0626)}{0.3325}\ X_2 - \underset{(28.26)}{104.33}\ X_3$$

where Y is domestic tonnage in thousands of short tons

X_2 is Georgia personal income in millions of 1967 dollars

X_3 is year (1950 = 1, etc.)

$r^2 = .87$ Standard error of estimate = 218

Brunswick Export Freight

$$Y = -151 + 0.648\ X_2$$
$$(.055)$$

where Y is export tonnage in thousands of short tons

X_2 is gross national product in billions of 1968 dollars for the European Community (Belgium, France, Germany, Italy, Luxembourg, and the Netherlands)

$r^2 = .96$ Standard error of estimate = 13

Savannah Export Freight

$$Y = -427 + 3.757\ X_2$$
$$(.273)$$

where Y is export tonnage in thousands of short tons

X_2 is gross national product in billions of 1968 dollars for the European Community (Belgium, France, Germany, Italy, Luxembourg, and the Netherlands)

$r^2 = .95$ Standard error of estimate = 97

Brunswick Import Freight

$$Y = 226 + 27.99\ X_2$$
$$(4.87)$$

where Y is import tonnage in thousands of short tons

X_2 is year (1958 = 1, etc.)

$r^2 = .85$ Standard error of estimate = 81

Savannah Import Freight

$$Y = 684 + 0.0165\ X_2$$
$$(.0021)$$

where Y is import tonnage in thousands of short tons

X_2 is southeastern personal income in millions of 1967 dollars

$r^2 = .85$ Standard error of estimate = 278

Brunswick Total Freight

$$Y = 15 + 53.13\ X_2$$
$$(2.95)$$

where Y is total tonnage in thousands of short tons

X_2 is year (1950 = 1, etc.)

$r^2 = .97$ Standard error of estimate = 94

Savannah Total Freight

$$Y = 1{,}287 + 0.0416\ X_2$$
$$(.0041)$$

where Y is total tonnage in thousands of short tons

X_2 is southeastern personal income in millions of 1967 dollars

$r^2 = .92$ Standard error of estimate = 518

Georgia Ports Authority Facilities at Brunswick

$$Y = 22 + 10.54\ X_2$$
$$(2.16)$$

where Y is GPA tonnage in thousands of short tons

X_2 is fiscal year (1960-1961 = 1, etc.)

$r^2 = .84$ Standard error of estimate = 26

Georgia Ports Authority Facilities at Savannah

$$Y = -777 + 0.0244\ X_2$$
$$(.0009)$$

where Y is GPA tonnage in thousands of short tons

X_2 is southeastern personal income in millions of 1967 dollars

$r^2 = .99$ Standard error of estimate = 110

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